1-1-1955

Test 560: Ford Model 640

Tractor Museum
University of Nebraska-Lincoln, TractorMuseumArchives@unl.edu

The Experiment Station
University of Nebraska College of Agriculture
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering
Dates of test: September 19 to October 4, 1955
Manufacturer: FORD MOTOR COMPANY, BIRMINGHAM, MICHIGAN
Manufacturer's rating: Not rated

NEBRASKA TRACTOR TEST NO. 560

FORD 640

FUEL, OIL and TIME Gasoline Octane No. ASTM 80.1 **Research** 85.7 (rating taken from oil company's typical inspection data) **weight per gallon** 6.125 lb **OIL** SAE 20 **to motor** 1.257 gal **drained from motor** 1.194 gal **Total time motor was operated** 42 hours.

CHASSIS Type Standard **Serial No.** 24262 **Tread width** rear 52" to 76" front 52" to 80" **Wheel base** 74.5" **Hydraulic control system** direct engine drive **Advertised speeds mph** first 3.13 second 4.02 third 5.54 fourth 11.55 reverse 3.64 **Belt pulley** diam 9" **face** 6½" **rpm** 1358 **Belt speed** 3200 fpm **Clutch** single plate clutch operated by foot pedal **Seat** pressed steel **Brakes** internal expanding shoes operated by two foot pedals located on right hand side of tractor **Equalized** by foot action only **Power take-off** conventional type.

ENGINE Make Ford **Type** 4 cylinder vertical **Serial No.** 24262 **Crankshaft mounted** lengthwise **Head** I **Lubrication** pressure **Bore and stroke** 3.4375" x 3.60" **Rated rpm** 2000 **Compression ratio** 6.6 to 1 **Displacement** 134 cu in **Port diameter valves** inlet 1.46" exhaust 1.26" **Governor** variable speed centrifugal fly ball **Carburetor size** ⅞" **Ignition system** battery **Starting system** 6 volt battery **Air cleaner** oil washed wire mesh **Muffler** was used **Oil filter** full flow with replaceable element **Cooling medium temperature control** thermostat.

REPAIRS AND ADJUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with carburetor set for 100% maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H, J, and K were made with an operating setting of the carburetor (selected by the manufacturer) of 94.8% of maximum belt horsepower.

BELT HORSEPOWER TESTS

Hp	Crank shaft speed rpm	Fuel Consumption: Gal per hour	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hour	Water used gal per hour	Temp Deg F: Cooling med	Temp Deg F: Air	Barometer inches of mercury
TEST B—100% MAXIMUM LOAD—TWO HOURS								
31.01	2000	2.909	10.66	0.574	0.00	183	69	28.810
TEST C—OPERATING MAXIMUM LOAD—ONE HOUR								
29.46	2000	2.681	10.99	0.557	0.00	184	66	28.820
TEST D—RATED LOAD—ONE HOUR								
27.64	2001	2.575	10.73	0.571	0.00	183	65	28.790
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)								
27.62	2001	2.571	10.74	0.570	...	185	66	.....
1.91	2148	1.131	1.69	3.628	...	152	66	.....
14.29	2062	1.798	7.95	0.770	...	163	65	.....
27.74	1825	2.469	11.24	0.545	...	178	65	.....
7.38	2119	1.406	3.07	1.167	...	158	65	.....
20.75	1995	2.150	9.65	0.635	...	167	65	.....
16.62	2025	1.921	8.65	0.708	0.00	167	65	28.775

TORQUE (At Dynamometer)										
Eng. rpm	2001	1864	1744	1620	1496	1365	1243	1125	1004	870
Lb-ft	177.5	179.0	182.2	185.0	186.7	190.2	194.4	197.9	197.4	192.0
Dyn. rpm	869	809	757	703	649	592	539	488	435	377

DRAWBAR HORSEPOWER TESTS

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption: Gal per hour	Fuel Consumption: Hp-hr per gal	Fuel Consumption: Lb per hp-hr	Water used gal per hour	Temp Deg F: Cooling med	Temp Deg F: Air	Barometer inches of mercury
TEST H—RATED LOAD—TEN HOURS—2nd Gear											
22.39	1873	4.48	1998	8.05	2.268	9.87	0.621	0.00	175	62	29.179
TEST F—100% MAXIMUM LOAD											
28.59	2437	4.40	1999	9.79	2nd gear				187	60	29.140
TEST G—OPERATING MAXIMUM LOAD											
25.48	3008	3.18	1997	16.13	1st gear (part throttle)				170	62	29.140
27.13	2291	4.44	1999	8.93	2nd gear				176	57	29.140
27.34	1625	6.31	1999	5.89	3rd gear				171	57	29.140
25.09	688	13.68	2010	2.75	4th gear				170	72	29.140
TEST J—OPERATING MAXIMUM LOAD											
22.08	2016	4.11	2004	16.89	2nd gear (part throttle)				174	67	29.110
TEST K—OPERATING MAXIMUM LOAD											
20.30	1909	3.99	2003	16.82	2nd gear (part throttle)				172	67	28.940

TIRES, WHEELS AND WEIGHT

	Tests F, G, & H	Test J	Test K
Rear wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	546 lb each	None	None
Rear tires			
No. and size	Two 11-28	Two 11-28	Two 10-28
Ply	4	4	4
Air pressure	12 lb	12 lb	12 lb
Front wheels			
Type	Pressed steel	Pressed steel	Pressed steel
Liquid ballast	None	None	None
Added cast iron	None	None	None
Front tires			
No. and size	Two 5.50-16	Two 5.50-16	Two 5.50-16
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
Height of drawbar	23 inches	23½ inches	22½ inches
Static weight			
Rear end	2816 lb	1724 lb	1714 lb
Front end	1134 lb	1132 lb	1130 lb
Total weight as tested with operator	4125 lb	3031 lb	3019 lb

HORSEPOWER SUMMARY

	Drawbar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F. and 29.92" Hg)	29.36	32.45
2. Observed maximum horsepower (tests F and B)	28.59	31.01
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	22.02	27.58

We, the undersigned, certify that this is a true and correct report of official tractor test No. 560.

L. F. LARSEN
Engineer-In-Charge

L. W. HURLBUT
G. W. STEINBRUEGGE
J. J. SULEK
Board of Tractor Test Engineers

EXPLANATION OF TEST REPORT

TEST A: The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

BELT HORSEPOWER TESTS

TEST B: The throttle valve is held wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

TEST C: For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is held wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors which have an altogether different fuel system.

TEST D: The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

TEST E:

Varying load serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads, of 20 minutes each: rated load, no load, ½ rated load, maximum load at wide open throttle valve, ¼ and ¾ rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

Torque, lb-ft at dynamometer, is obtained with wide open throttle and sufficient load is applied to give several readings.

DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same dirt test course which is maintained by grading, sprinkling and rolling so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

TEST F: A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

TEST G: Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

TEST H: Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

TEST J: The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

TEST K: Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.